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INFECTION RATE AND CHEMOTHERAPY OF VARIOUS HELMINTHS IN GOATS IN AND AROUND LAHORE

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ABSTRACT

The current study was carried out to find out the infection rate of gastrointestinal tract (GIT) helminths and its association with diarrhoea in goats in Lahore, Pakistan. For this purpose, 300 faecal samples from goats suffering from diarrhoea presented at the Outdoor Hospital, Department of Clinical Medicine and Surgery, UVAS Lahore and various private as well as government hospitals located in Lahore were examined coprologically for the presence of helminths. The result revealed that an overall infection rate of GIT helminths was 63.33% in goats. When compared the class wise infection rate, highest infection rate of nematodes (42.67%) was observed, followed by trematodes (16.67%) and cestodes (4%). The efficacy of Ricobendazole was observed to be 62, 96 and 98% at day 3, 7 and 14 of treatment, respectively. The efficacy of Ricobendazole was higher than Albendazole (46, 83 and 94% at day 3, 7 and 14, respectively). Lowest efficacy of garlic powder against helminth parasites was observed (13, 28 and 34% at day 3, 7 and 14, respectively). It was concluded that Ricobendazole is the most effective drugs against helminths in goats.

Key words: Helminthes, Albendazole, Ricobendazole, garlic powder, chemotherapy, goats.

INTRODUCTION

Sheep and goats, although representing an important source of animal protein in third world countries including Pakistan, seem to have benefited little from veterinary care and production improvement. Animals of these species are often the main source of daily meat and are used in ceremonial festivities throughout the country. They also produce a considerable amount of manure, which is of special importance in those areas where cattle are of lesser importance (Nawathe *et al*., 1985).

Parasites are a major cause of health problems in goats. They cause the animals to be unthrifty which may include the loss of weight, low birth weights, and difficulty in kidding. Due to parasitism, the animals become susceptible to other health problems which can lead to death. Goats harbour a variety of gastrointestinal parasites, many of which are shared by both species. Among these, helminths are the most important gastrointestinal tract parasites that affect the growth as well as production of the animal. Gastrointestinal nematodes of Trichostrongylidae family are perhaps the most important parasites of small ruminants worldwide, causing significant morbidity and loss of production (Pawel *et al*., 2004).

Helminthic infections can be treated by anthelmintic chemotherapy, however, treatment is costly and drug resistance has been developed in all major parasite species (Zajac and Gipson, 2000; Veale, 2002). Compared to sheep, which develop a strong natural immunity around 12 months of age, goats acquire a lower level of immunity to gastrointestinal parasites. Anthelmentics are also required for the treatment of parasitism in goats. However, there is a significant difference in their physiology which means that the level of active ingredient in goat blood declines more rapidly after treatment than in sheep. This has the potential to reduce the effectiveness of treatment and because of that selection of drug resistant strains of parasites can be much quicker in goats than in sheep (Mortensen *et al*., 2003).

In Pakistan, little information is available about the infection rate, diversity and intensity of helminths as cause of diarrhoea in small ruminants. Moreover, there are a few studies regarding efficacy and resistance against the common dewormers being used in the field as prophylactic and therapeutic agents. Hence, the present study was designed to determine the infection rate of gastrointestinal helminthes in goats and to evaluate the efficacy of various anthelmentics under local conditions.

MATERIALS AND METHODS

Samples

This study was conducted at Medicine Laboratory, University of Veterinary and Animal Sciences Lahore, Pakistan during September to November, 2007. A total of 300 goats presented for the treatment of diarrhea at the Outdoor Hospital, Department of Clinical Medicine

and Surgery, University of Veterinary and Animal Sciences, Lahore and various private as well as government hospitals around Lahore city were examined for the presence of helminths. Five grams faecal sample was collected directly from the rectum of each animal in a clean polythene bag. These faecal samples were labeled and refrigerated till further processing. The faecal samples were analysed by Direct Smear Method and Salt Flotation Techniques for the presence of eggs of helminthes. Eggs per gram (EPG) were counted by using Mac-Master Technique as described by Soulsby (1982). The identification of helminthic ova was made by using key as demonstrated by Soulsby (1982).

Chemotherapy trials

Sixteen animals positive for helminths were randomly divided into four groups designated as A, B, C and D, each comprising of four animals. Another four animals negative for helminths were kept in group E. The animals of group A were treated with Ricobendazole @ 4 mg/kg (Ricozole-S; Selmore Pharmaceuticals, Pakistan) orally; the animal of group B were treated with Albendazole @ 10 mg/kg orally (Albenzole granules; Selmore Agency, Pakistan) and the animals of group C were treated with garlic powder @ 1 teaspoon (5 gm). The animals of group D were kept as positive control, whereas the animals of group E served as negative control. Eggs per gram (EPG) of the animals of all the four groups were counted at day 0 (Pre-treatment) and day 3, 7, 14 post-treatment by using Mac-Master technique. The efficacy of drugs was calculated as per formula described by Varady *et al*. (2004):

[(Pretreatment EPG - Post treatment EPG / Pretreatment EPG]*100

Statistical analysis

The data thus obtained were analysed at different angles by calculating percentage positivity of helminths. Data of drug efficacy was analysed by using one way and multivariate 'ANOVA' (Steel *et al*., 1997).

RESULTS AND DISCUSSION

The results of present study revealed an overall infection rate of GIT helminths in goats as 63.33%. Similarly, Raza *et al*. (2007) reported the infection rate of GIT helminths in goats as 52% in Southern Punjab. When classwise infection rate of GIT helminthes was compared, it was found to be 42.67, 16.67 and 4.00% for nematodes, trematodes and cestodes, respectively. *Haemonchus contortus*, *Strongylus papillosus*, *Trichiuris globulosa*, *Trichostrongylus spp*. and *Ostertagia circumcinta* were the main nematode species observed in goats. The infection rate of *Haemonchus contortus* was the highest (Table 1). According to the study of Jacquiet *et al*. (1992), the infection rate of *Haemonchus contortus* was the highest in goats which is congruent with the finding of the present study. A significant difference in the prevalence of *Haemonchus contortus* has been recorded between different breeds of sheep and goats (Chaudary *et al*., 2007).

Fakae (1990) studied the epidemiology of helminthosis in small ruminants under the traditional husbandry system in eastern Nigeria and reported prevalance of *Haemonchus contortus* (87.1%), *Trichostrongylus spp*. (63.8%), *metacestodes of Taenia hydatigena* (30.2%), *Oesophagostomum columbianum* (22.4%), *Strongyloides spp.* (18.8%), *Cooperia spp.* (17.2%), *Gaigeria pachyscelis* (6.0%), *Moniezia expansa* (6.0%), *Bunostomum trigonocephalum* (4.3%), *Trichuris ovis* (3.5%), *Capillaria spp*. (0.9%) and *Paramphistomes* (0.9%). In this area, the mixed infections were the most prevalent and the endemicity of parasitic gastroenteritis in the area was indicated by the high prevalence of the helminths irrespective of the season of the year.

The main trematode species recovered from goats in the present study were *Fasciola hepatica* (10.00%) and *Cotylophoron cotylophorum* (6.67%). Sheikh (1984) reported 12.89% infection rate of *Fasciola hepatica,* while Tasawar *et al.* (2007) reported higher (28.75%) prevalence of *Fasciola hepatica* in goats. Two species of family *Fascioloidae* commonly occur in domestic ungulates are *Fasciola hepatica* and *Fasciola magna.*

In the present study, *Moniezia expansa* was the only cestode species prevalent in goats in Lahore, Pakistan, with infection rate of 4%. Fagbemi and Dipeolu (1983) also reported the *Moniezia expansa* in goats in Southern Nigeria.

Table 1: Infection rate of different parasites in goats

Parasite spp	Number of positive samples	Infection rate (%)
Haemonchus contortus	84	28.00
Strongylus papillosus	18	6.00
Trichiuris globulosa	14	4.67
Trichostrongyloidae spp	04	1.34
Ostertagia circumcinta	08	2.67
Cotylophoron cotylophoron	20	6.67
Fasciola hepatica	30	10.00
Moniezia expansa	12	4.00

Fakae (1990) studied the epidemiology of helminthiasis in small ruminants under the traditional husbandry system in eastern Nigeria and reported the infection rate of *Moniezia expansa* as 6% in small ruminants. The minor difference in results may be due to different geoclimatic conditions and study areas. Ndao *et al*. (1995) studied the epidemiology of gastro-

intestinal helminthiasis in small ruminants in the tree-cropping pasture zone in Senegal. All the animals examined were infected with at least one helminth species. Three trematodes (*Fasciola gigantica, Schistosoma bovis and Amphistomatids*), two cestodes (*Moniezia expansa and Cysticercus tenuicollis*) and nine nematodes were identified.

Therapeutic efficacy

In the present study, the efficacy of Albendazole, Ricobendazole and garlic powder was determined (Table 2). The efficacy of Ricobendazole (albendazole sulphoxide) was 62, 96 and 98% at days 3, 7 and 14, post treatment, respectively. The efficacy of Ricobendazole was higher than Albendazole and was 46, 83 and 94% at day 3, 7 and 14, respectively. However, between Ricobendazole and Albendazole, the efficacy difference was very small because Ricobendazole and Albendazole fall in the same group, Ricobendazole being the analog of Albendazole. The minor difference may be due to the fact that Albendazole is most commonly used drug compared to Ricobendazole and there is chance of drug resistance. Efficacy of garlic powder against helminths was lower (13, 28 and 34% at day 3, 7 and 14, respectively) compared to other two drugs. When compared at different days as well as group wise efficacy of Albendazole, Ricobendazole and garlic powder, a significant difference ($p<0.05$) was found among the drugs during day wise. Ricobendazole reduced the EPG significantly, followed by Albendazole and garlic powder compared with positive control group. Ram *et al*. (2007) studied the comparative efficacy of albendazole, albendazole plus rafoxanide combination, ivermectin and doramectin. The study was conducted in Pashmina goats infected with *Haemonchus spp.* and maintained at high altitude (>2350 m above sea level). They reported that albendazole was least effective (14%), followed by its combination with rafoxanide (54%). These findings do not correlate with the findings of the present study. The reason may be the drug resistance of parasites against albendazole in the study area**.** Waruiru (1997) studied the efficacy of closantel, albendazole and levamisole on an ivermectin resistant strain of *Haemonchus contortus* in sheep and found that all the anthelmintics resulted in reduced worm burdens in animals infected with the susceptible strain (albendazole, 99.0%).

In Israel, many horse and donkey owners consider garlic as a viable alternative to commercial anthelmintics (Sutton and Haik *et al.*, 1999). However, in the present study, garlic showed very poor results in goats compared to other anthelmintics.

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Table 2: Comparative efficacies (%) of albendazole, ricobendazole and garlic powder in goats at different days intervals

Drugs	Days after Treatment					
	3rd		7th		14th	
	EPG	Efficacy (%)	EPG	Efficacy (%)	EPG	Efficacy (%)
Ricobendazole**	213 ± 31.458	62	25 ± 14.434	96	13 ± 12.500	98*
Albendazole*	325 ± 94.648	46	100 ± 20.412	83	38 ± 12.500	94*
Garlic powder	350 ± 35.355	13	288 ± 31.458	28	263 ± 31.458	34

** Highly significant ($p<0.01$); *significant ($P<0.05$).

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